

BIOGRAPHICAL SKETCH

NAME: Zhiting Tian

eRA COMMONS USER NAME: N/A

POSITION TITLE: Associate Professor

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
Tsinghua University, Beijing, China	B.E.	07/2007	Engineering Physics
Binghamton University, Binghamton, NY	M.S.	05/2009	Mechanical Engineering
MIT, Cambridge, MA	Ph.D.	06/2014	Mechanical Engineering

A. Personal Statement

The overarching goal of my research is to fundamentally understand nanoscale thermal transport processes to enable the design and discovery of new materials/devices with unprecedented thermal functionalities and energy conversion efficiency. My research has a direct impact on thermal energy conversion and management in a diverse array of applications, including renewable energy conversion, microelectronics cooling, space and building technologies, and biomedical engineering.

B. Positions and HonorsAcademic Positions

Assistant Professor, Mechanical Engineering, Virginia Tech, August 2014-June 2018

Assistant Professor, Mechanical and Aerospace Engineering, Cornell University, July 2018-June 2020

Associate Professor, Mechanical and Aerospace Engineering, Cornell University, July 2020-present

Associate Editor, Journal of Applied Physics, August 2020-present

Selected Honors

- 2020 ASME Fellow
- 2019 President's Council of Cornell Women (PCCW) Affinito-Stewart Award
- 2019 ACS Polymeric Materials Science and Engineering (PMSE) Young Investigator Award
- 2018 Eugene A. Leinroth Sesquicentennial Faculty Fellow, Cornell University
- 2018 College of Engineering Faculty Fellow, Virginia Tech
- 2018 ONR Young Investigator Award
- 2017 NSF CAREER Award
- 2017 ACS Petroleum Research Fund Doctoral New Investigator Award
- 2017 Outstanding New Assistant Professor Award, College of Engineering, Virginia Tech
- 2017 3M Non-Tenured Faculty Award
- 2016 Undergraduate Research Advisor Award, College of Engineering, Virginia Tech
- 2014 Wunsch Foundation Silent Hoist and Crane Award: Academic Excellence, MIT
- 2013 Graduate Women of Excellence, MIT

C. Contributions to Science

My key scientific accomplishments since I started my independent research group in 2014 include (1) Understanding thermal transport in crystalline solids using synchrotron sources; (2) Uncovering interfacial thermal transport using atomistic Green's function; (3) Unveiling the underlying mechanisms of thermal transport in polymers; (4) Advancing thermoelectric materials and devices.

D. Additional Information:

2505 citations and h-factor of 21 (According to Google Scholar as of 1/20/2021)

REFEREED JOURNAL ARTICLES (_ Tian lab students underlined)

1. C. Li, H. Ma, T. Li, J. Dai, J. Rasel, A. Mattoni, A. Alatas, M. Thomas, Z. Rouse, S. Baker, J. Feser, D. Mitzi, **Z.T. Tian**, "Remarkably Weak Anisotropy in Thermal Conductivity of Two-Dimensional Hybrid Perovskite $(\text{C}_4\text{H}_9\text{NH}_3)_2\text{PbI}_4$ Crystals", *Nano Letters* (under revision)
2. H. Huang and **Z.T. Tian**, "Topological Phonon-Magnon Hybrid Excitations in Two-Dimensional Honeycomb Ferromagnet", *Physical Review B* (under revision)
3. R. Hu, and **Z.T. Tian**, "Direct Observation of Phonon Anderson Localization in Si/Ge Aperiodic Superlattices", *Physical Review B* 103, 045304 (2021)
4. J. Dai, and **Z.T. Tian**, "Large Thermal Conductivity of Boron Suboxides Despite Complex Structures", *Applied Physics Letters* (accepted, selected as featured article)
5. X. Wei, Z. Wang, **Z.T. Tian**, and T. Luo, "Thermal Transport in Polymers: A Review", *Journal of Heat Transfer* (accepted, invited)
6. R. J. Warzoha, A. A. Wilson, B. F. Donovan, N. Donmezer, A. Giri, P. E. Hopkins, S. Choi, D. Pahinkar, J. Shi, S. Graham, and **Z.T. Tian**, "Applications and Impacts of Nanoscale Thermal Transport in Electronics Packaging", *Journal of Electronic Packaging* (accepted)
7. H. Ma, C. Li, and **Z.T. Tian**, "Hydrogen Bonds Significantly Enhance Out-of-Plane Thermal and Electrical Transport in Graphamid", *ACS Applied Nano Materials* 3, 11090-11097 (2020)
8. Y. R. Koh, J. Shi, B. Wang, R. Hu, H. Ahmad, S. Kerdsonpanya, E. Milosevic, W. A. Doolittle, D. Gall, **Z. T. Tian**, S. Graham, and P. E. Hopkins, "Thermal Boundary Conductance Across Epitaxial Metal/Sapphire Interfaces", *Physical Review B* 102, 205304 (2020)
9. E. Kanimba, T. Yang, S. Huxtable, L. Li and **Z.T. Tian**, "Thermomechanical analysis of a bio-inspired lightweight multifunctional structure", *Advanced Engineering Materials* 2000371 (2020)
10. T. Zhang, J. Zhang, Z. Wang, Z. Chen, C. Li, Z. Wang, K. Li, X. Huang, H. Zhang, **Z.T. Tian**, H. Chen, L. Zhao and L. Wei, "Single-crystal SnSe thermoelectric fibers via laser-induced directional crystallization: from 1D fibers to multi-dimensional fabrics", *Advanced Materials* 32, 2002702 (2020)
11. Z. Cheng, Y.R. Koh, H. Ahmad, R. Hu, J. Shi, M. Liao, Y. Wang, T. Bai, R. Li, E. Lee, E. Clinton, C. Matthews, Z. Engel, L. Yates, T. Luo, M. Goorsky, A. Doolittle, **Z.T. Tian**, P. Hopkins, S. Graham, "Thermal Conductance across Harmonic-Matched Epitaxial Al-Sapphire Heterointerfaces", *Communications Physics*, 3, 115 (2020)
12. J. Dai, and **Z.T. Tian**, "Rigorous Formalism of Anharmonic Atomistic Green's Function for Three-dimensional Interfaces", *Physical Review B: Rapid Communications* 101, 041301(R) (2020)
13. H. Ma, Y. W. Ma, and **Z.T. Tian**, "A Simple Theoretical Model for Thermal Conductivity of Crystalline Polymers", *ACS Applied Polymer Materials* 1(10), 2566-2570 (2019)
14. H. Ma, C. Li, Y. W. Ma, H. Wang, Z.W. Rouse, Z. Zhang, C. Slebodnick, A. Alatas, S.P. Baker, J.J. Urban, and **Z.T. Tian**, "Super Compliant and Soft $(\text{CH}_3\text{NH}_3)_3\text{Bi}_2\text{I}_9$ Crystals with Ultralow Thermal Conductivity", *Physical Review Letters* 123, 155901 (2019)
15. C. Zawaski, E. Wilts, C. Chatham, A. Stevenson, A. Pekkanen, C. Li, **Z.T. Tian**, A. Whittington, T. Long, C. Williams, "Tuning the Material Properties of a Water-Soluble Ionic Polymer using Different Counterions for Material Extrusion Additive Manufacturing", *Polymer*, 176, 283-292 (2019)
16. J. J. Urban, A. K. Menon, **Z.T. Tian**, A. Jain, K. Hippalgaonkar, "New Horizons in Thermoelectric Materials: Correlated Electrons, Organic Transport, Machine Learning, and More", *Journal of Applied Physics* 125, 180902 (2019)
17. **Z.T. Tian**, "Anderson Localization for Better Thermoelectrics?", *ACS Nano*, 13(4), 3750-3753 (2019)
18. H. Ma, H. Babaei, and **Z.T. Tian**. "The Importance of van der Waals Interactions to Thermal Transport in Graphene-C60 Heterostructures", *Carbon* 148, 196-203 (2019)
19. E. Kanimba and **Z.T. Tian**, "A New Dimensionless Number for Thermoelectric Generator Performance", *Applied Thermal Engineering* 152, 858-864 (2019)
20. C. Li, and **Z.T. Tian**, "Phonon Transmission across Silicon Grain Boundaries by Atomistic Green's Function Method", *Frontiers in Physics: Computational Physics* 7(3), 1-6 (2019)
21. H. Ma, Y. W. Ma, H. Wang, C. Slebodnick, A. Alatas, J. Urban, and **Z.T. Tian**, "Experimental Phonon Dispersion and Lifetimes of Tetragonal $\text{CH}_3\text{NH}_3\text{PbI}_3$ Perovskite Crystals", *Journal of Physical Chemistry Letters* 10 (1), 1-6 (2019)
22. H. Ma, and **Z.T. Tian**, "Chain Rotation Significantly Reduces Thermal Conductivity of Single-Chain Polymers", *Journal of Materials Research, Early Career Scholars in Materials Science Annual Issue* 34(1), 126-133 (2019)
23. H. Ma, E. O'Donnel, and **Z.T. Tian**, "Tunable Thermal Conductivity of π -Conjugated Two-Dimensional Polymers", *Nanoscale* 10, 13924-13929 (2018)

24. S. Zou, E. Kanimba, T. Diller, **Z.T. Tian**, and Z. He, "Modeling Assisted Evaluation of Direct Electricity Generation from Waste Heat of Wastewater via a Thermoelectric Generator", *Science of the Total Environment* 635, 1215-1224 (2018)
25. C. Li, Y.W. Ma, and **Z.T. Tian**, "Thermal Switching of Thermoresponsive Polymer Aqueous Solutions", *ACS Macro Letters* 7, 53-58 (2018)
26. H. Ma and **Z.T. Tian**, "Significantly High Thermal Rectification in an Asymmetric Polymer Molecule Driven by Diffusive versus Ballistic Transport", *Nano Letters* 18, 43-48 (2018)
27. E. Kanimba, M. Pearson, J. Sharp, D. Stokes, S. Priya, and **Z.T. Tian**, "A Comprehensive Modeling of a Lead Telluride Thermoelectric Generator", *Energy* 142, 813-821 (2018)
28. E. Kanimba, M. Pearson, J. Sharp, D. Stokes, S. Priya, and **Z.T. Tian**, "A Modeling Comparison between a Two-stage and Three-stage Cascaded Thermoelectric Generator", *Journal of Power Sources* 365, 266-272 (2017)
29. G.S. Jung, J.J. Yeo, **Z.T. Tian**, Z. Qin, M. J. Buehler, "Unusually Low and Density-Insensitive Thermal Conductivity of Three-Dimensional Gyroid Graphene", *Nanoscale* 9(36), 13477-13484 (2017)
30. H. Ma and **Z.T. Tian**, "Effects of Polymer Topology and Morphology on Thermal Transport: A Molecular Dynamics Study of Bottlebrush Polymers", *Applied Physics Letters* 110, 091903 (2017)
31. C. Li and **Z.T. Tian**, "Thermal Transport Properties of Black Phosphorus: A Topical Review", *Nanoscale and Microscale Thermophysical Engineering* 21(1), 1-13 (2017)
32. C. Li, H. Ma and **Z.T. Tian**, "Thermoelectric Properties of Crystalline and Amorphous Polypyrrole: A Computational Study", *Applied Thermal Engineering* 111, 1441-1447 (2017) (Invited for a special issue on thermoelectric energy conversion, peer-reviewed)
33. H. Ma, C. Li, S. Tang, J. Yan, A. Alatas, L. Lindsay, B. Sales, and **Z.T. Tian**, "Boron Arsenide Phonon Dispersion from Inelastic X-Ray Scattering: Potential for Ultrahigh Thermal Conductivity", *Physical Review B: Rapid Communications* 94, 220303 (R) (2016)
34. A. Consiglio and **Z.T. Tian**, "Importance of the Hubbard-Correction on the Thermal Conductivity Calculation of Strongly-Correlated Materials: a Case Study of ZnO", *Scientific Reports* 6, 36875 (2016)
35. B. Qiu, G. Chen and **Z.T. Tian**, "Effects of Aperiodicity and Roughness on Coherent Heat Conduction in Superlattices", *Nanoscale and Microscale Thermophysical Engineering*, 19(4):272-278 (2015)
36. H. Ma and **Z.T. Tian**, "Effects of Polymer Chain Confinement on Thermal Conductivity of Ultrathin Amorphous Polystyrene Films", *Applied Physics Letters*, 107, 073111 (2015)
37. **Z.T. Tian**, M. Li, Z. Ren, H. Ma, A. Alatas, S. D. Wilson, and J. Li, "Inelastic X-Ray Scattering Measurements of Phonon Dispersion and Lifetimes in $\text{PbTe}_{1-x}\text{Se}_x$ Alloys", *Journal of Physics: Condensed Matter*, 27, 375403 (2015)
38. **Z.T. Tian**, A. Marconnet, and G. Chen, "Enhancing Solid-Liquid Interface Thermal Transport using Self-Assembled Monolayers", *Applied Physics Letters*, 106, 211602 (2015)
39. N. Yang, T. Luo, K. Esfarjani, A. Henry, **Z.T. Tian**, J. Shiomi, Y. Chalopin, B. Li, and G. Chen, "Thermal Interface Conductance between Aluminum and Silicon by Molecular Dynamics Simulations", *Journal of Computational and Theoretical Nanoscience*, 12, p1-7 (2015)
40. B. Qiu, **Z.T. Tian**, A. Vallabhaneni, B. Liao, J. M. Mendoza, O. Restrepo, X. Ruan, and G. Chen, "First-Principles Simulation of Electron Mean-Free-Path Spectra and Thermoelectric Properties in Silicon", *Europhysics Letters* 109, 57006 (2015) (one of the most downloaded papers from 2015)
41. **Z.T. Tian**, K. Esfarjani, and G. Chen, "Green's Function Studies of Phonon Transport across Si/Ge Superlattices", *Physical Review B* 89, 235307 (2014)
42. S. Lee, K. Esfarjani, T. Luo, J. Zhou, **Z.T. Tian**, and G. Chen, "Resonant Bonding Leads to Low Lattice Thermal Conductivity", *Nature Communications* 5, 3525 (2014)
43. **Z.T. Tian**, S. Lee and G. Chen, "Heat Transfer in Thermoelectric Materials and Devices", *Journal of Heat Transfer*, 135(6), 061605 (2013) (Invited for the 75th Heat Transfer Division Anniversary, peer-reviewed)
44. **Z.T. Tian**, H. Han and Y. Sun, "A Molecular Dynamics Study of Effective Thermal Conductivity in Nanocomposites", *International Journal of Heat and Mass Transfer*, 61, 577-582 (2013)
45. K. Collins, A. Maznev, **Z.T. Tian**, K. Esfarjani, K. Nelson, and G. Chen, "Non-Diffusive Relaxation of a Transient Thermal Grating Analyzed with the Boltzmann Transport Equation", *Journal of Applied Physics*, 114, 104302 (2013)
46. Q. Zhang, S. Yang, Q. Zhang, S. Chen, W. Liu, H. Wang, **Z.T. Tian**, D. Broido, G. Chen and Z. Ren, "Effect of Aluminum on the Thermoelectric Properties of Nanostructured PbTe", *Nanotechnology* 24, 345705 (2013)

47. **Z.T. Tian**, K. Esfarjani and G. Chen, "Enhancing Phonon Transmission across Si/Ge Interface by Atomic Roughness: First-Principles Study with the Green's Function Method", *Physical Review B* 86, 235304 (2012)
48. **Z.T. Tian**, J. Garg, K. Esfarjani, T. Shiga, J. Shiomi and G. Chen, "Phonon Conduction in PbSe, PbTe, and PbTe_{1-x}Se_x from First-Principles Calculations", *Physical Review B* 85, 184303 (2012)
49. Q. Zhang, H. Wang, W. Liu, H. Wang, B. Yu, Q. Zhang, **Z.T. Tian**, G. Ni, S. Lee, K. Esfarjani, G. Chen and Z. Ren, "Enhancement of Thermoelectric Figure-Of-Merit by Resonant States of Aluminum Doping in Lead Selenide", *Energy & Environmental Science*, 5, 5246 (2012)
50. **Z.T. Tian**, K. Esfarjani, J. Shiomi, A. S. Henry and G. Chen, "On the Importance of Optical Phonons to Thermal Conductivity in Nanostructures", *Applied Physics Letters* 99, 053122 (2011)
51. **Z.T. Tian**, Y. Sun and B. White, "Phonon Wave-packet Interference and Phonon Tunneling Based Energy Transport across Nanostructured Thin Films", *Applied Physics Letters* 96, 263113 (2010)